

NAME P/N QTY	CRIT	FAILURE MODE & CAUSES	FAILURE EFFECT	RATIONALE FOR ACCEPTANCE															
FABRIC ATTACHMENT RING ITEM 103 (1) LEFT (1) RIGHT ----- 10145-05 (2)	2/1R	103FM11  Loss of primary cam pin of restraint bracket.  Defective material; cam pin, bracket or retention screws.	END ITEM: Loss of primary axial restraint.  GFE INTERFACE: Axial load will be transferred to secondary restraint.  MISSION: None.  CREW/VEHICLE: None with loss of primary restraint. Loss of crewman with loss of secondary restraint.  TIME TO EFFECT /ACTIONS: Minutes.	A. Design - The fabric attachment ring cam bracket and primary pin are fabricated from 17-4 stainless steel bar stock. The bracket and pin are heat treated to a condition H-1050, ultrasonically cleaned, pasivated and either electropolished or dry hone finished. The primary cam pin has a 16 finish to preclude restraint webbing abrasion. The primary cam pin adjusts to allow increase or decrease in axial length of the primary webbing. A spring and ball detent system allows for positioning of the cam pin. The cam pin is retained by two 17-4 stainless steel retention screws.  Analysis of the restraint bracket cam pin shows a minimum ultimate strength of 840 lbs. and a yield strength of 765 lbs. At 4.4 psid (normal operating pressure) the S/AD limit load is 219 lbs., giving the bracket pin a safety factor of 3.8 for ultimate and 3.5 for yield. At 5.5 psid (max. failure pressure) and 8.8 psid (max. BTA operating pressure) the bracket pin provides safety factors for ultimate of 4.1 and 5.3 respectively. The S/AD minimum safety factor for hardware at 4.4 psid is 2.0 for ultimate and 1.5 for yield. At both 5.5 psid and 8.8 psid the S/AD minimum safety factor for hardware is 1.5 for ultimate.  Rotation of the cam pin can only occur in one direction. The axial load of the primary restraint, when pressurized reacts in the opposite direction of the designed rotation, hence inadvertant rotation while pressurized is precluded.  B. Test - PDA: The following tests are conducted at the Arm Assembly level in accordance with ILC Document 0111-7110112: 1. Proof pressure test at 8.0 + 0.2 - 0.0 psig to verify no structural damage.  Certification: The fabric attachment ring was successfully tested (manned) during SSA certification to duplicate 458 hours operational life (Ref. ILC Report 0111-711330). The following usage, reflecting requirements of significance to the sizing ring, was documented during certification: <table border="1"> <thead> <tr> <th>Requirement</th> <th>S/AD</th> <th>Actual</th> </tr> </thead> <tbody> <tr> <td>Elbow/Cycles</td> <td>49660</td> <td>102000</td> </tr> <tr> <td>Engage/Disengage</td> <td>300</td> <td>400</td> </tr> <tr> <td>Don/Doff</td> <td>98</td> <td>400</td> </tr> <tr> <td>Pressure Hours</td> <td>458</td> <td>916</td> </tr> </tbody> </table> C. Inspection - Components and material manufactured to ILC requirements at an approved supplier are documented from procurement through shipping by the supplier. ILC incoming receiving inspection verifies that the hardware received are as identified in the procurement documents, that no damage has occurred during shipment and that supplier certifications have been received which provide traceability information.  The following MIPs are performed during the arm bearing assembly manufacturing process to assure that the failure causes are precluded from the fabricated item:	Requirement	S/AD	Actual	Elbow/Cycles	49660	102000	Engage/Disengage	300	400	Don/Doff	98	400	Pressure Hours	458	916
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		103FM11		<p>1. Visually inspect static seal for damage. 2. Visually inspect ring for scratches and burrs.</p> <p>During PDA, the following inspection points are performed at the arm assembly level per ILC Document 0111-710112:</p> <ol style="list-style-type: none"><li>1. Inspection for cleanliness to VC level.</li><li>2. Visual inspection for damage, wear or material degradation.</li><li>3. Visual inspection for damage following proof-pressure test.</li></ol> <p>D. Failure History - None.</p> <p>E. Ground Turnaround - Inspected per FEMU-R-001, Pre-Flight Visual Inspection. Additionally, every 4 years chronological time or 229 hours of manned pressurized time, the fabric ring is disassembled, cleaned, inspected, lubricated and reassembled.</p> <p>F. Operational Use - Crew Response - Pre EVA/Post EVA: Trouble shoot problem, consider use of third EMU. If no success terminate EVA prep. EMU is no go for EVA. EVA: When CWS data confirms SOP activation, abort EVA.</p> <p>Training - Standard training covers this failure mode.</p> <p>Operational Consideration - Flight rules define go/no go criteria related to EMU pressure integrity and regulation. EVA checklist procedures verify hardware integrity and systems operational status prior to EVA. Real Time Data System allows ground monitoring of EMU systems.</p>

EXTRAVEHICULAR MOBILITY UNIT  
SYSTEMS SAFETY REVIEW PANEL REVIEW  
FOR THE  
I-103 ARM ASSEMBLY  
CRITICAL ITEM LIST (CIL)

EMU CONTRACT NO. NAS 9-97150

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